PATENT SPECIFICATION

1,097,651

DRAWINGS ATTACHED

1,097,651

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Date of filing Complete Specification: Sept. 2, 1966.

Application Date: Sept. 3, 1965. No. 37727/65.

Complete Specification Published: Jan. 3, 1968.

Index at acceptance :—B1 C(18H, 28)

Int. Cl.:—B 01 f 11/04

COMPLETE SPECIFICATION

Improvements in Vibratory Compactors

We, STOTHERT & PITT LIMITED, a Company organised under the laws of Great Britain, of Bath, Somerset., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to vibratory compactors, particularly vibrating pokers and other forms of high frequency vibratory immersion compactors used for the compaction of freshly placed unset concrete and similar materials which behave as a fluid under the influence of high frequency vibration.

There is a need when using such machines to detect when the optimum period of immersion for the required degree of consolidation has been achieved so as to prevent waste of time and labour through excessive periods of immersion, or defective results through insufficient immersion.

The object of the invention is to provide a compactor which will indicate when the required degree of compaction has been achieved, and alternatively or additionally terminate the operation without depending on the skill of the operator.

When a compactor is immersed in unset concrete it is found that the rate of power absorbed from the associated vibrator increases rapidly to a maximum and then falls at a decreasing rate to a relatively constant or slowly decreasing value somewhat higher than that prior to immersion. When this value is reached the maximum degree of compaction which can be achieved with the compactor at that position has been reached.

According to the invention, a vibratory immersion compactor comprising a vibrator includes means responsive to the rate of power consumption of the vibrator and indicator and control means associated with said response means.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a block diagram showing a compactor comprising a mechanical vibrating poker driven by an electric motor,

Figure 2 is a possible circuit diagram for the control, indication and signal equipment of the compactor,

Figure 3 shows an alternative electrically vibrated poker which could be used with the same type of system, and

Figure 4 is a typical graph showing the variation of power consumption with time throughout the period of immersion of the poker in concrete.

Referring to Figure 1, the compactor is supplied from an electrical power source 1, and comprises control, indication and signal equipment 2 which includes a meter 3 for continuous power or current consumption indication and a preset control 4 for setting the value of power or current at which a signalling means 5 is operated and the power to a motor 6 is disconnected. A push button or similar type of switch 10 is provided for starting the vibrator. The electric motor 6 drives a mechanical vibrating poker 8 through a flexible drive shaft 7. With known types of mechanical vibrating poker driven by an electric motor A.C. current is usually used at normal mains frequency, the higher frequency required for the vibration being obtained by mechanical speed increasing means within the poker. If an electrically vibrated poker 9 with internal electrical means of producing vibration, is used, then the electrical power source 1 will be required to supply A.C. current at the frequency of the desired vibration.

Referring to Figure 2, the meter 3 is connected in one of the three wires forming a three phase supply line to the vibrator motor 6 (or the vibrator 9) in parallel with a shunt resistance 11 across which is developed a po-

tential proportional to the current consumption of the vibrator motor. The reading of the meter can be interpreted to indicate the degree of compaction achieved and the point at which maximum compaction has been achieved, or any other predetermined condition short of maximum compaction. The equipment 2 also includes means such as a voltage sensitive electric relay or equivalent electronic device 12 arranged to control a signal 5 which may be a coloured light and to disconnect the power supply to the poker by means of main contacts 15 when the power or current consumption falls below a certain predetermined value preset by means of a potentiometer control 4 associated with the relay 12.

Since the power consumption prior to and immediately after immersion of the poker in concrete is below the preset value corresponding to the compacted state (see Fig. 4), it is necessary to incorporate the manually operated switch 10, to energise a solenoid 17 which closes contacts 15 and initiates and maintains the operation of the poker until the preset value of power consumption has been exceeded and relay 12 operates to close contacts 13 and 14, thus maintaining energisation of solenoid 17 and completing circuit energising the signal 5. The switch 10 which may be a push button switch, can then be released.

In the case of the signal being, say, a red light, the operation of the compactor would be as follows:—

The supply to the vibrator motor 6 is switched on by means of the push button switch 10. The light 5 comes on shortly after the compactor is immersed due to the relay 12 operating contacts 14 as the power consumption exceeds the preset value (see Fig. 4) and the push button can at this stage be released since the relay operated contacts 13 are now closed thus holding closed contacts 15 by means of solenoid 17. The light stays on and the compactor continues in operation until a predetermined state of compaction corresponding to a drop in the rate of power or current consumption to the preset level (see Fig. 4) has been achieved when the compactor will stop and the light will go out, due to relay 12 releasing contacts 13 and 14, signalling that the compactor can be moved to another position. The light can work in the reverse manner to that described or other visual or auditory or any other form of signal can be used instead of a light.

The same system can be used for vibratory immersion compactors driven mechanically, hydraulically, pneumatically or by other mediums, by merely fitting an appropriate control, indication or signal equipment to measure or respond to variation in the rate of power consumption of the vibrator, or a parameter related to the rate of power consumption.

It should be noted that equipment for control (such as relay 12), indication (such as meter 3) and signalling (such as lights) may be provided singly or in any combination. It is not essential that they should all be provided.

WHAT WE CLAIM IS:—

1) A vibratory immersion compactor comprising a vibrator and including means responsive to the rate of power consumption of the vibrator and indicating, signalling or control means associated with said response means.

2) A vibratory immersion compactor according to claim 1 in which the vibrator is electrically driven.

3) A vibratory immersion compactor according to claim 2 in which the indication means is a meter.

4) A vibratory immersion compactor according to claim 2 or 3 in which the control means is a relay.

5) A vibrator immersion compactor according to any of claims 2—4 in which the signalling means is a relay controlled light or audible signal.

6) A vibratory immersion compactor substantially as described with reference to the accompanying drawings.

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Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.
—1968. Published by The Patent Office, 25 Southampton Buildings, London, W.C.2,
from which copies may be obtained.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig.1.

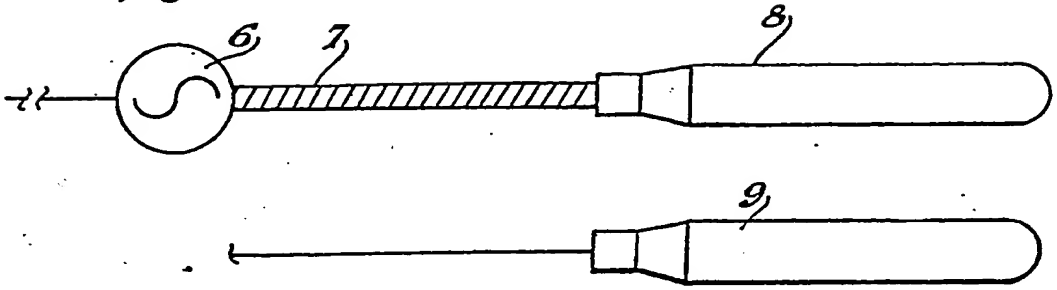
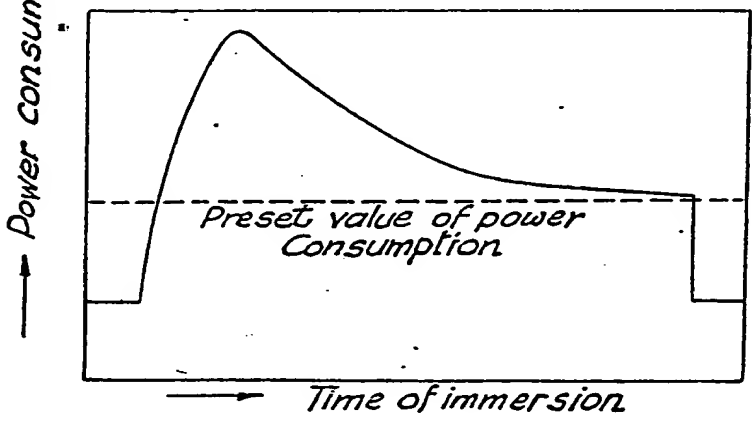


Fig.3.

Fig.4.



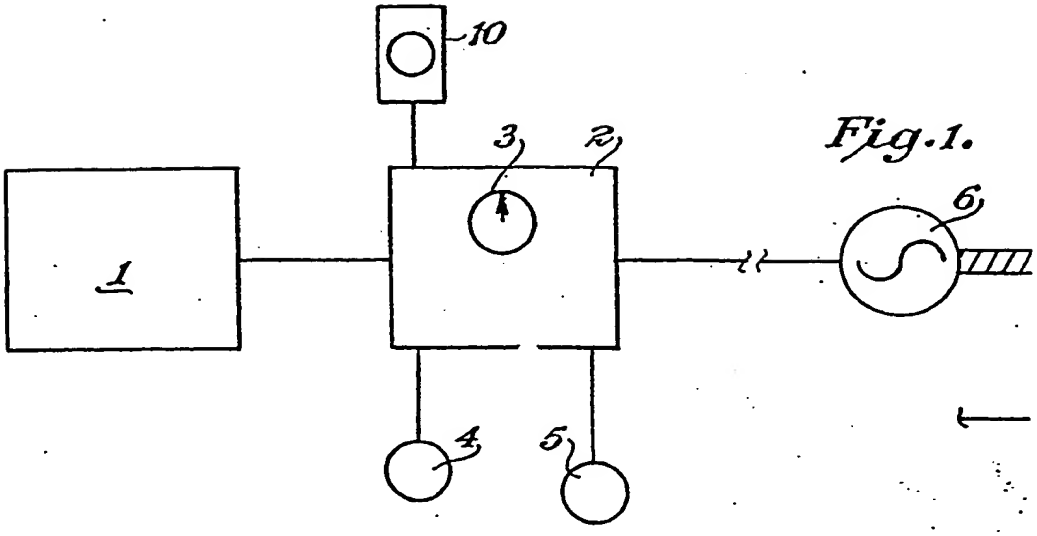
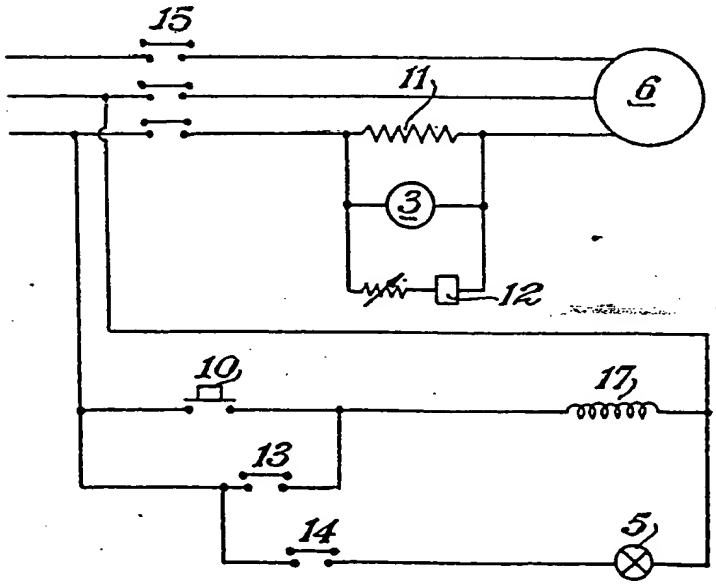


Fig.1.



Power consumption

Fig.2.

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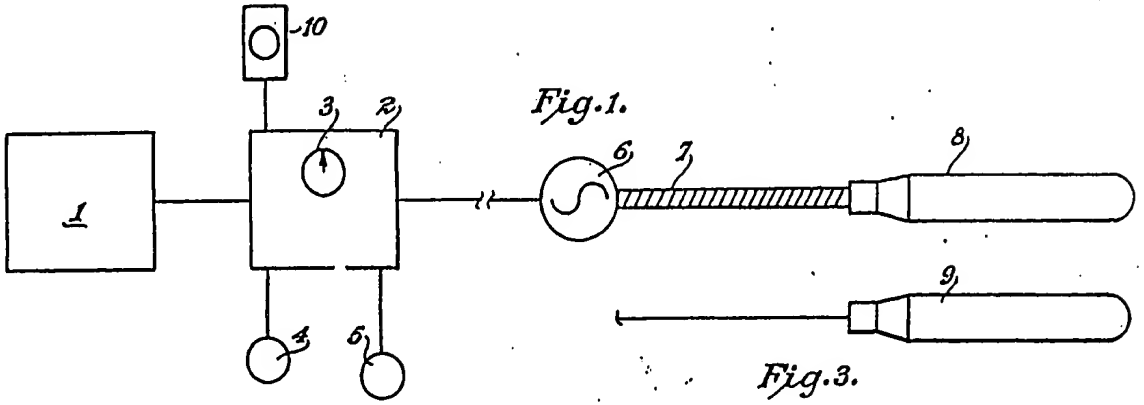

Fig.1.

Fig.3.

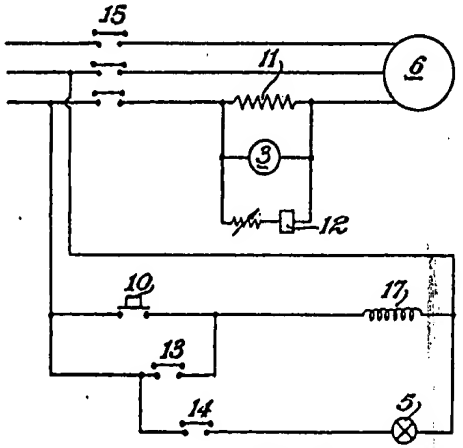

Fig.2.

Fig.4.